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**SUMMARY OF STATISTICS  
FOR**

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**CARTRIDGE & PROPELLANT  
ACTUATED DEVICES**

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**FEBRUARY 1970**



**DEPARTMENT OF THE ARMY  
FRANKFORD ARSENAL  
PHILADELPHIA PA., 19137**

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Summary of PAD Statistics  
Revised 1 Feb 1970

Data furnished below per References "A" summarizes progress  
in PAD to dates shown.

Standardized Devices

Cartridges..... 56

Hardware

Catapults..... 16  
Cutters..... 7  
Delay Elements..... 11  
Ignition Elements..... 7  
Initiators..... 52  
Releases..... 1  
Removers..... 14  
Thrusters..... 28  
Locking Assemblies..... 1  
Generators..... 4

141

Total..... 197

Patents..... 114 (pages 1 thru 4)

Patent Actions in Progress..... 19 (page 5)

Technical Reports..... 282 (pages 6 thru 28)

References A:

Nomenclature list for PAD, July 1969  
Appendices C & D, PAD Monograph, updated to 15 April 1969  
Patent Status Report, September 1969

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PATENTS GRANTED TO FRANKFORD ARSENAL PERSONNEL  
FOR PROPELLANT ACTUATED DEVICE INVENTIONS  
(February 1951 to September 1969 Inclusive)

<u>Patent No.</u>	<u>Inventor(s)</u>	<u>Invention</u>
2541087	Musser	Safety Device for Catapulting Passengers from Aircraft
2667837	Musser/Turnbull	Hermetically-Sealed Explosive Cartridge
2719458	Stott	Electrically Fired Percussion Primer
2726055	Musser	Catapult for Aircraft Personnel and Other Uses
2726576	Musser	Device for Releasing an Article from a Space-Traversing Object
2780961	Musser/Dietsch	Device for Moving Objects such as Aircraft Canopies
2852982	Musser	Aerial Carry and Release Mechanism
2857889	Stott/Magnus	One Stroke Thruster with Speed Reducer
2857890	Stott	Thruster with Damper
2873648	Musser/Dietsch	Remote Control Fluid Pressure Responsive Actuator
2873726	Stott	Tension Thruster with Buffer
2880572	Fawcett/Laager	Thruster
2883909	Musser/Stott/Benditt	Firing Head for Cartridge Actuated Catapult
2892452	Weinstock	Load-Sensitive, Gas-Operated Thruster
2903849	Fawcett/Stott/Laager	Uniform Velocity Thruster
2910053	Stott/Shinaly	Rotary Thruster
2912901	Kroeger/Rolle	One Power Stroke Thruster with Split Cartridge Case Lock
2925011	Musser/Markgraf	Pressure Responsive Thruster Locking Means
2925754	Fillman	Single Hook Bomb Release and Ejector
2926638	Magnus/Stott	Thruster with By-pass
2928319	Sokolowski	Cartridge Actuated Catapult with Split Inner Tube
2931299	Sokolowski	Impeller
2935911	Kroeger/Rolle	One Power Stroke Thruster with Locking Cartridge Case
2935971	Stott/Magnus	Single Cycle Self-Retracting Thruster
2941833	Musser	Parachute Release Connection
2942818	Stott	Reefing for Static Line Cutter
2942911	Stott	Parachute Disconnect Coupling
2946284	Triscoll/Musser/Cicccone	Explosive Cartridge
2949330	Musser	Post Landing Parachute Release
2949822	Musser	Bomb Release Device
2951338	Stott/Magnus	Explosively Actuated Control Device
2968291	Weinstock	Controlled Acceleration Personnel Escape Catapult

<u>Patent No.</u>	<u>Inventor(s)</u>	<u>Invention</u>
2980085	Schneider	Thruster, Rotary
2982642	Rolle	Propellant with High Auto-Ignition Temperature
2984211	Schneider	Thruster, Capsule Door Closure
2988066	Stott	Double Acting Actuator
2989381	Musser	Non-Corrosive Gas Generator
2994309	Stott	Damper Jettisoning Canopy Remover
2996046	Skopp/Clark	Thruster, Canopy Unlock
2996272	Stott/Waecker	Controlled Thrust Ejection Capsule Rocket
3000173	Stott/Magnus	Gunsight Retracting Thruster
3015994	Simmons/Stott	Stabilization Boom for Aircraft Encapsulation Seat
3001743	Simmons	Disengage Mechanism for Aircraft Arresting Gear Tail Hook
3012542	Miller	Reactor Control Rod Operating System
3015162	Stott	Selective Multicycle Actuator
3015462	Simmons/Stott	Stabilization Boom for Aircraft Encapsulated Seat
3020883	Weinstock/Sutter	Pneumatic Servo Valve and Actuator
3027124	Stott	Encapsulated Seat Stabilizing Mechanism
3032015	Weinstock	Servo Valve Controlled Mechanism
3033175	Stott	Rotary Thruster with Gas Operated and Manual Unlock
3034289	Stott/Waecker	Solid Propellant Catapult with Liquid Propellant Rocket Assist
3034335	Miller/Kent	Primer Functioning Tester
3043093	Stott	Cable Coupled Actuator
3053131	Stott	Explosively Released Bolt
3055619	MacDonald/Stott/Waecker	Extensible Rocket Catapult
3057263	MacDonald/Waecker/Markgraf	Means for Absorbing Energy of Impulses
3066486	Kirshner/Silverstein	Self-Contained Means of Obtaining a Prescheduled Gas Pressure-Time Relationship
3077325	Skopp/Litz	Load Positioning Device
3078940	Rolle	Propellant Energized Ground Effect Machine
3089418	Steifel	Gas Generator for Guided Missiles
3090228	Laager/Mathias	Testing of Cartridge Actuated Devices
3093353	Pisano/Pitney	Aircraft Protecting and Ejecting System
3099961	Stott	Multi-choice Firing Mechanism
3107616	Boaz/Litz	Sliding Door Opening Mechanism
3111293	Stott/Litz	Seat Positioning Device
3112670	Litz	Gas Pressure Operated Device

<u>Patent No.</u>	<u>Inventor(s)</u>	<u>Invention</u>
3122392	Benditt/Stott	Cartridge Operated Parachute Release Mechanism
3133408	Stott	Simplified Thruster
3145712	Litz	Percutaneous Medication Device
3148755	Pisano	Clutch, Gear Type
3149456	Sterrett	Gas Damped Thruster
3149457	Kent	Thruster, XM10
3149804	Litz	Anti-Stall System
3152027	Godsey	Heat Resistant Propellants*
3169443	Stott	Propellant Actuated Release Bolt
3173635	Simmons	PAD Sequencer
3176941	Skopp/Boaz	T24 Thruster Modification, Load Unlocking and Actuating Thruster
3180082	Benditt	Canopy Unlock Thruster
3190588	Pisano	Canopy Actuator Remover
3202385	Waecker/MacDonald/ Schaffling	Seal for High Differential Pressures
3218927	Stott	Remover, Hatch
3218929	LaCosta/Strickland/ Barr	Multi-Tube Launcher*
3222015	Larsen/Weinstock/ LeVino	Helicopter Escape Means
3225654	Barr	Multi-Package Launcher*
3229913	McCallum	Emergency Removal of Aircraft Sustaining Means
3236480	Stott	Capsule Ejection Rocket Catapult
3237889	Litz	Anti-Stall
3239273	Pi .ney	Lap Belt Tightener
3242864	Levy/Quinlan/ White	Cartridge with Improved Vibration Resistance for Propellant Actuated Devices
3242939	Fogg	Explosive Operated Valve
3259769	Stott	Pulse Generator
3260048	Waecker/Benditt	Improved Ignition System for Rocket Catapults
3262265	Waecker/Benditt	Combined Rocket and Catapult Motors
3282161	MacDonald/Waecker	Dual Thrust Catapult Ejector
3283501	Peterson	Gas Generating Apparatus and Method
3285176	Kent	Pressure Tight Igniter Fitting
3285539	Litz	Gas Generating System
3305319	Kowalick	Propellant Gas Generator
3314229	Peterson	Stake Extracting Apparatus
3317362	Doris	Igniter Composition for Aircraft Ejection Apparatus
3318034	Stott	Mounting Mechanism
3321102	Simmons	Container Seal with Integral Means for Unsealing

<u>Patent No.</u>	<u>Inventor(s)</u>	<u>Invention</u>
3336869	Peterson/Kowalick	Fuze Apparatus
3343487	Hare/Kowalick	Pyrotechnic Delay Device for Mild Detonating Fuse
3362215	Weinstock	Apparatus for Testing Seals for PAD Measuring Leakage and Leakage Rates
3362665	Larsen/LeVino	Method of Combining Parachute and Inflatable Rotary-Wing Aircraft and Blades
3372893	Larsen/LeVino	Air to Ground Descent Means
3388879	Pisano/Daniels	Electronic Time Means for Explosion
3390636	Perkins, Et Al	Electric Initiating Device
3397030	Pisano/Pitney	Gas Generating System
3401750	Larsen	Flame Repellant Apparatus
3447767	MacDonald/Bagwell	Rocket Catapult
3449165	Stott	Pyrotechnic Thermal Battery
3457826	Stott	Launching Apparatus

\*Developed under F.A. Contract, assigned to U. S. Government.



PATENT ACTIONS IN PROGRESS  
(Period Ending September 1969)

<u>Case</u>	<u>Status</u>	<u>Inventor(s)</u>	<u>Title</u>
1600	Filing Award Approved	Miller	Subminiature Reefing Line Cutter
1620	Filing Award Approved	Pisano	Stake Extractor
1665	Draft Typed	Miller, Et Al	Powered Take-up Inertia Reel
1667	Final Form Typed	Cicccone, Et Al	Improved Propellant Gas Generator
1781	Referral to another Agency	Litz	PAD All Gas Computer and Flight Stability System
1838	Office Action No. 1	Halstead, Et Al	Improved Propellant for Cool Gas Generator
1839	Filing Award Approved	Travor, Et Al	Sampling Apparatus
1854	Search Recommended	W. White, Et Al	Improved Propellant Cartridge
1868	Disclosure Acknowledged	Meranshian	Cool Gas Generator
1966	Filing Award Approved	Nimylowycz	Manifold Valve for Gas Generator
1967	Search Recommended	DeStefano, Et Al	Gas Generator Propel- lant
1968	Search Recommended	Nimylowycz	Rotatable Nozzle for Ejection Rocket Catapult
1977	Inquiry Letter	Litz, Et Al	PAD Reactionless Launcher with Variable Velocity for Aircraft
1987	Draft Typed	Sutter, Et Al	Liquid Shaped Charge Mixing Pump System
2033	Disclosure Acknowledged	Pisano	Initial Lock and Re- lease Mechanism
2034	Draft Typed	Larsen, Et Al	PAD Cartridge Initiated Self-Sufficient Jet Fuel Starter for Aircraft Engines
2110	Received	Stott	Dynamic Seal Test Apparatus
2113	Received	McCormick	Method of Programming PAD Ignition Sequence
2114	Received	Larsen	Collapsible Power Chute

INDEX OF REPORTS  
ON  
PROPELLANT ACTUATED DEVICES  
PREPARED AND PUBLISHED  
BY  
FRANKFORD ARSENAL  
PHILADELPHIA, PENNSYLVANIA  
(1946 thru 1969)

1 FEBRUARY 1970

TECHNICAL REPORTS

<u>REPORT NO.</u>	<u>TITLE</u>
R-759 (U)	Characteristics of Catapults, Aircraft Personnel, T-2 and T-4, by S. D. Rolle, January 1947
R-782 (U)	Development of Cartridge T-108 for the Aircraft Canopy Remover, T2, by G. E. Hirt, March 1947
R-808 (U)	Horizontal Type Tester No. 1 for Aircraft Personnel Catapults, by A. Stott and J. C. Odink, Jr., June 1947
R-852 (U)	Development and Manufacture of Cartridge, T95E2, for the Catapult, Aircraft Personnel, T4E1 (M1) by P. J. Wilds, April 1948
R-867 (U)	Investigation of the Cook-off Temperature of the Cartridge, Catapult, M28, by S. D. Rolle and N. K. Turnbull, July 1948
R-895 (U)	Development of Cartridge M29 for the Aircraft Canopy Remover, M1, by J. J. Gricius, March 1949
R-896 (U)	Automatic Electronic Equipment Developed for Recording of Data from Tests on Aircraft Personnel Catapults, by R. F. LeVino and O. Markowitz, March 1949
R-928 (U)	Effort Required to Fire the Aircraft Personnel Catapult, M1, by F. W. Dietsch, July 1949
R-941 (U)	Catapult, Aircraft Personnel, M1 and Cartridge. Catapult, M28, by S. D. Rolle and C. W. Musser, Jan 1950
R-956 (U)	Method of Manufacture of Cartridge T114 for the Aircraft Personnel Catapult T7, by J. J. Gricius, December 1949
R-1005 (U)	Manufacture of Cartridge T129 for Initiator T4 - An Actuating Device for Aircraft Personnel Catapults and Canopy Removers, by J. Clark, March 1951
R-1033 (U)	Determination of Velocities of Aircraft Personnel Catapults by Measurement of Time of Flight of Test Weight, by R. H. Thomas, September 1951

R-1058 (U) Development of Cartridge M31 (T121) in Remover, Aircraft Canopy M2 (T6), by S. D. Rolle, May 1952

R-1183 (U) Cartridge Actuated Devices for Aircraft Use, Status Report 1 Jan - 30 June 1953

R-1187 (U) Cartridge Actuated Devices for Aircraft Use, Status Report 1 July - 31 Oct 1953

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R-1222 (U) Cartridge Actuated Devices for Aircraft Use, Status Report 1 June - 31 Aug 1954

R-1224 (U) Use of a High-Speed Digital Computer for Analysis of Catapult Performance, by C. M. King, Oct 1954

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R-1242 (U) Development of a Canopy Jettisoning System for Airplane F-84F, A. K. Oechele and H. L. Muller, Jan 1955

R-1244 (U) Personnel Escape System for the F86H Airplane, A. K. Oechele, Feb 1955

R-1249 (U) Cartridge Actuated Devices for Aircraft Use, Status Report 1 Dec 1954 - 28 Feb 1955

R-1254 (U) Method of Manufacture of Cartridge, Thruster, T181 (M42), T183, T183E1 (M44), T184, R. T. Fillman, Mar 1955

R-1258 (U) Personnel Escape System for the F-102A Airplane, A. K. Oechele, Apr 1955

R-1259 (U) Development of Removers with Cartridge, T12 and T12E1 by A. K. Oechele, April 1955

R-1260 (U) Development of Canopy Jettisoning Systems for the F-94C and T33A (TV-2) Airplanes by A. K. Oechele, April 1955

R-1272 (U) Cartridge Actuated Devices for Aircraft Use, Status Report 1 March - 31 May 1955 (Mar - May 1955)

R-1276 (U) Development of Catapult, M4 and Cartridge, CAD, M37 by R. T. Fillman and L. F. Garfield, August 1955

R-1292 (U) Method of Manufacture of Cartridge, CAD, M31A1, for Removers, M2A1 and M3, R. T. Fillman, Oct 1953

R-1296 (U) Cartridge Actuated Devices for Aircraft, Use Status Report, 1 June - 30 Sept 1955

R-1310 (U) Development of a Variable Reluctance Voltage Generator and an Impeller and their Integration into an Electrically Initiated Aircraft Personnel Escape System by H. A. Sokolowski, J. L. Helfrich and S. D. Rolle, March 1956

R-1311 (U) Quarterly Progress Report on Cartridge Actuated Devices Supplement to Frankford Arsenal Quarterly Progress Report on Research and Development Projects 1 Oct - 31 Dec 1955 (Dec 1955)

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R-1324 (U) Development and Evaluation of Initiators, M3 and M5A1, L. D. Sachs, June 1956

R-1331 (U) Ballistic and Mechanical Development of Thruster, M5A1, L. R. Henry and L. D. Sachs, Feb 1956

R-1332 (U) Ballistic and Mechanical Development of Thruster, M1A1, L. R. Henry and L. D. Sachs, Feb 1956

R-1343 (U) Ballistic and Mechanical Development of Thruster, M2A1, by L. R. Henry and L. D. Sachs, May 1956

R-1344 (U) Development and Evaluation of Delay Initiators, M4 and M6A1, L. D. Sachs, May 1956

R-1346 (U) Investigation of Catapults and Tests of Catapults Under Simulated Operating Conditions, N. J. Waecker, Aug 1956

R-1347 (U) Evaluation of Canopy Jettison System Proposed for Use in B-57B Airplane by J. E. Brozek, September 1956

R-1352 (U) Design and Development of Indoctrination Catapult, Aircraft Personnel Training, '46 (T14E1), with Cartridge, M57 (157) by F. A. Florio and H. A. Sokolowski, October 1956

R-1361 (U) Quarterly Progress Report on Cartridge Actuated Devices, 1 July - 30 September 1956

R-1362 (U) Development and Evaluation of Initiator, Delay, M10 (T16E2) by L. D. Sachs, July 1956

R-1363 (U) Evaluation of the Escape Systems for the B-52 and RB-52 Airplanes by R. J. Connors and L. D. Sachs, Jan 1957

R-1367 (U) Development of Aircraft Canopy Removers, T14 and T15, by N. J. LaCosta, January 1957

R-1375 (U) A Study of Methods of Determining Acceleration in Performance Tests of Aircraft Personnel Catapults by S. D. Rolle, February 1957

R-1384 (U) Development of Thruster, T16 by F. H. Suszek and L. D. Sachs, March 1957

R-1399 (U) Development of Initiators, S. Kent, July 1957

R-1445 (U) Development of a Cartridge Actuated Device Thruster, T6 (M6), C. S. Sterrett, Feb 1958

R-1458 (U) Development of a Cartridge Actuated Device, Remover, T8, C. S. Sterrett, May 1958

R-1459 (U) Development of a Cartridge Actuated Device, Thruster, T9, C. S. Sterrett, Apr 1958

R-1460 (U) Investigation of Limiting Conditions for Functioning M3 Initiators and Gas-Operated CAD, C. L. Fulton, July 1958

R-1463 (U) Propellant Charge Design Studies Using an M3 Catapult, H. A. Kirshner, M. E. Levy and L. Stiefel, Aug 1958

R-1466 (U) Development of Cartridge Actuated Devices, Initiator, T8 (M8), and Initiator, T17 (M9), C. S. Sterrett, Jul 1958

R-1468 (U) Kinematic Study of M3 and M5 Initiators in Conjunction with M38 Cartridge, W. W. Cavell, Sept 1958

R-1469 (U) Sealing Studies on Cartridge Actuated Devices, J. F. Clark, Sept 1958

R-1477 (U) Feasibility and Reliability Studies of Electrically Initiated Systems for Cartridge Actuated Devices, J. H. Daniels, Oct 1958

R-1486 (U) Modification of M28A1 Cartridge to Improve Performance of M5 Catapult, R. H. Bagwell, Oct 1958

R-1501 (U) Mechanical Aspects of the Investigation of the Feasibility of Initiating Cartridge Actuated Devices Electronically, F. T. Eisano, Feb 1959

R-1502 (U) Development of a Cartridge Actuated Device, Thruster, T28, C. S. Sterrett, Feb 1959

R-1508 (U) Development of a Cartridge Actuated Device, Initiator, T28, W. E. Chandler, Feb 1959

R-1539 (U) Development and Qualification of Thruster, Propellant Actuated, T25, A. Benditt and D. J. Savory, Oct 1962

R-1547 (U) A Basic Investigation of Controllable Thrust Devices for Escape from Space Vehicles, Phase I, Part I, Vol. I (Summary Report) by W. Boaz, Jan 1961

R-1548 (U) A Basic Investigation of Controllable Thrust Devices for Escape from Space Vehicles, Phase I, Part I, Vol. II (Supporting Data) by W. Boaz, Feb 1961

R-1557 (U) Development of Catapult Aircraft Ejection Seat, T20, H. MacDonald and N. Waecker, Dec 1961

R-1563 (U) Solid Propellant Gas Generator for Hydraulic System of the NIKE AJAX Guided Missile, W. E. Perkins, L. Stiefel, G. Catrambone, June 1960

R-1565 (U) Solid Propellant Powered Hydraulic System for the NIKE Hercules Guided Missile, W. E. Perkins, L. Stiefel, G. Catrambone and R. Sutter, July 1960

R-1567 (U) Development of Propellant of Improved Thermal Stability for the M73 CAD Cartridge, M. E. Levy, Aug 1960

R-1571 (S) Development of Deco, Launching Systems for Ballistic Target Missile (U), J. F. Clark, Sept 1960

R-1582 (C) Development of Propellant Actuated Missile Rotator System (U), G. Catrambone and L. Stiefel, Mar 1961

R-1584 (U) Basic Investigation of Operation of PAD in Space Environment, Phase III-Experimental Studies, Part 2-Solar Radiation, G. Skopp, June 1963

R-1587 (U) Development and Qualification of Thruster, Cartridge Actuated T33 for Jettisoning of the T38 Aircraft Canopy, C. J. Litz and A. E. White, May 1961

R-1588 (U) Support of F103 Capsule Sled Test Program (Development of Catapult, Aircraft Capsule Ejection, XM-17, and Thruster, Propellant Actuated, T-24), G. M. Skopp, May 1961

R-1590 (C) Development of Gas Operated Servomechanism (U), M. Weinstock and R. Sutter, May 1961

R-1595 (U) Basic Investigation of Operation of PAD in Space Environment, Phase III-Experimental Studies, Part 1-Nuclear Irradiation, G. Skopp, C. Fulton, and E. Doebley, June 1962

R-1598 (U) Design, Development, and Qualification Testing of Thruster, Cartridge Actuated, T31, G. H. Skopp and A. E. White, Oct 1961

R-1601 (U) Development and Qualification of Thruster, Cartridge Actuated, T30, S. J. Kent and A. E. White, Oct 1961

R-1608 (U) Development and Qualification of Remover, Aircraft Canopy, T18E1, F. T. Pisano and M. H. Long, Jan 1962

R-1609 (U) A Basic Investigation of Controllable Thrust Devices for Escape from Space Vehicles, Phase 1, Part II (Propellant and Ignition Study), C. W. Boaz, Oct 1961

R-1614 (C) A Review of Gas Generators and Gas Generator Propellants, L. Stiefel and H. Kirshner, Mar 1962

R-1624 (U) Basic Investigation of the Operation of Propellant Actuated Devices in Space Environment; Phase III, Experimental Studies; Part 3, Vacuum Studies, G. Skopp and C. Fulton, June 1962

R-1625 (U) Basic Investigation of the Operation of Propellant Actuated Devices in Space Environment; Phase III, Experimental Studies; Part 4, Acceleration and Ozone Studies, G. Skopp, June 1962

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R-1634 (U) Development and Qualification of Initiators T36, T37, T38 and T39, C. A. Glaser, May 1962

R-1635 (U) Development of Thruster, Cartridge Actuated, XM-14, C. A. Glaser, May 1962

R-1636 (U) Development and Qualification of Thruster, Cartridge Actuated, T26, C. A. Glaser, May 1962

R-1637 (U) Modification of the T27 Thruster, Development of the XM11 and XM12 Thrusters, and Qualification of the XM11 Thruster, C. Sterrett and L. Triscoli, June 1962

R-1638 (U) Development of T8, T9, T10 and T11, and Qualification of T7, T8 and T9 Drag Chute Ejectors, A. Benditt and L. Triscoli, Oct 1962

R-1639 (U) Development and Qualification of Thruster, Cartridge Actuated, XM-16, A. White, Dec 1962

R-1640 (U) Feasibility Study of an Explosively Actuated Flash Protection Device, by F. Pisano, January 1964

R-1641 (U) Development of Low Energy Detonating Cord for Emergency Crew Escape Systems, W. Peterson, Mar 1963

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R-1645 (U) Development of Release Bolt, Nonfragmentation, R. Sutter, June 1962

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R-1656 (U) Propellant Actuated Device for Percutaneous Inoculation, C. J. Litz, Oct 1962

R-1657 (U) Development of Pilot Chute Ejector, Cartridge Actuated XM-1 for the Separable Nose Capsule Escape System, R. Dalterio, Oct 1962

R-1658 (U) Initiation of Propellant Combination in the M3 Aircraft Personnel Ejection Catapult (Photographic Studies), J. M. DeLeo and L. Tonik, Oct 1962

R-1661 (U) Improved Seals for Catapults, Removers, Thrusters and Initiators, M. Petronio and P. Faye Cummins, Dec 1962

R-1663 (U) Development of Vibration Resistant Propellants for the M91 PAD Cartridge, M. E. Levy, J. B. Quinlan, W. White, and E. F. VanArtsdalen, Dec 1962

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Part 2 - Computer Study and Experimental Program by W. Boaz, February 1964

R-1675 (U) Emergency Control of Boundary Layer on Aircraft Wings by Propellant Energy, A. E. Larsen and C. Litz, D. C. Hazen, F. C. Karins, and F. Carter, April 1963

R-1676 (U) Development of Thruster, Cartridge Actuated, XM10, S. Kent, April 1963

R-1679 (S) Supporting Studies and Evaluation of PAD for Minuteman Mark II Penetration Aids Program (U), C. Litz and J. DeLeo, May 1963

R-1680 (U) Qualification Tests of T7E1 and T8E1 Thrusters, M. Long and C. Sterrett, May 1963

R-1681 (U) Development of Miniature Cable Cutters XM6, XM7 and XM20, J. DiPhillipo, May 1963

R-1682 (U) Improvement of High Temperature Qualities of Primer Systems, J. DeLeo and E. Rechel, May 1963

R-1683 (U) Development of High Temperature Resistant Propellants, J. Godsey and W. P. Freese, June 1963

R-1684 (U) Development of Low Energy Detonating Cord (LEDC) for Emergency Escape Systems, Supplement I, W. Peterson, June 1963

R-1685 (U) Development of Cartridge, Powder Actuated Cutter, XM83 for Reefing Line, J. Farrell, June 1963

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